

Blackman Prof. Holden March  
(G. with author's regards)

AN ACCOUNT  
OF  
*Bind this cover in front*  
Chronic Hydrocephalus,

AND OF A

CASE IN WHICH PARACENTESIS WAS PERFORMED,

AND ON THE

STATISTICS OF THIS OPERATION.

*Presented by  
Henry March,*  
FROM THE NEW YORK JOURNAL OF MEDICINE.

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WITH ILLUSTRATIONS.

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AN ACCOUNT  
OF  
CHRONIC HYDROCEPHALUS.

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ABOUT the first of May, 1850, a child of Mr. P., of Newburgh, was placed under our care, for the treatment of chronic hydrocephalus. This child was six months of age; its body and extremities were well formed, but the appearance of its head is well represented in Fig. 1st. The circumference of the head was about thirty inches, and, when held between the eye and the light, it was perfectly transparent. The integuments were highly vascular at various points; and at its anterior and posterior portions there were bag-like protuberances, appearing as if about to burst from the pressure of the enormous quantity of fluid within. The health of the child was good, nutrition well performed, and, with the exception of the threatened rupture of the cranial coverings, there were no indications of immediate danger to life. The head began to enlarge very soon after birth, and continued to increase,

without crying, was deaf, and died without any convulsion or apparent struggle.

These are all the cases we have been able to find, corresponding with our own, as to the almost complete disappearance of the cerebral substance. It certainly is remarkable, that with such extensive disorganization the child should be able to see, hear, taste, feel, &c., and yet this was true not only in my own case but in that of Dr. Wetmore. Transparency of the head, we believe, is not a common feature in this disease, though it has been observed by Butcher (*Gazette Médicale*, 1843), as well as in the patient which came under our care.

The sudden and spontaneous disappearance of the fluid after diarrhœa, copious perspiration, cutaneous eruption, and other salutary crises, has been noticed by M. Nelaton (*Elem. de Path. Chirurg.*, vol. ii., p. 642). Dr. J. W. Hubbell has reported in the *New-York Journal of Medicine*, May, 1850, p. 396, an interesting case of hydrocephalus terminating spontaneously in recovery, after the appearance of an eruption on the side of the head, which gradually spread over the whole scalp, and kept up a constant and free discharge for the space of two months. The head constantly diminished, while the body increased in size. In two months, the bones of the cranium had approached each other, but not united. In three months, the sutures had united, and the eruption disappeared. The child was fat, and in every respect healthy. —No medication was used at any time. Frank mentions a case which disappeared on the invasion of a scrofulous affection in another part of the body; and both he and Gölis have seen very favorable effects from the appearance of eruptions. In our patient the fluid was transferred to the cellular tissue, covering the whole body.

We have alluded to the perfect manner in which nutrition was performed; and instances are on record in which patients thus affected have reached upwards of thirty years of age. Prof. Vrolik has represented, in his magnificent *Tabulae Embryogenesin Hominis*, &c. (plate 38), the skull taken from a



man, aet. 32, who died affected with internal hydrocephalus. This man "a prima infantia hydrocephalo laboravit, et cum eo ad satis provectam, quam dixi, aetatem pervenit, columnam dorsalem habebat curvatam. Inferioris corporis artus vix superioris pondus sustentare valebant. Ceteroquin erat sanus et nequaquam mente imbecillus." From the uniform and equal distention of the ventricles, this man's head appeared like that of a giant.

Rokitansky states (*Path. Anatomy*, Syd. Ed. vol. iii., p. 366) that, as a general rule, hydrocephalus is a symmetrical disease; and that its chief seat, in all its forms, is the lateral ventricles. When it is found in the arachnoid cavity, according to MM. Rilliet and Barthez (*Traité des Maladies des Enfants*), it is always the result of a hemorrhage from this serous membrane into its cavity; for it is in this variety that the fluid is generally found bloody.

The authors of the *Compendium de Chirurgie Pratique*, &c., Tome Deuxième, p. 537, remark that it is in these cases we sometimes meet with transparency; but, when seated in the ventricles, the latter, as in the cases related in connection with our own, and likewise by Ruppian, in Meissner's *Forschungen*, vol. iii., p. 240, may together form one huge cavity; and the cerebral mass around the ventricles, especially towards the top of the head, may, as stated by Rokitansky, and as observed in our own case, be so attenuated as scarcely to measure a line in thickness.

The substance of the brain is often compressed and atrophied, and occasionally it is lacerated at various points. Sometimes it becomes so expanded and so attenuated as to be with difficulty recognized. In some cases, doubtless, there is a close alliance between congenital hydrocephalus and hemicephalus, there being a decided arrest of development in the organum. "I believe," says Rokitansky, "that the really essential part of congenital hydrocephalus—that which arrests the development of the brain—is the affection of the ependyma; that, in proportion to the degree to which the hydrocephalus has advanced, and according to the period

of foetal life at which it commenced, it does, in various manner, and to different extent, arrest the development of the brain, and occasion monstrosity of it, and so far contains the ground of its alliance with hemicephalus, hydrencephalocoele, singleness of the cerebrum (cyclopia), &c. (*Op. cit.*, p. 363.)



Fig. 2.

The diagnosis of hydrocephalus, though generally, is not always, unattended with difficulties. For example, in some cases the dimensions of the head, as in the cases observed by Gall, Gölis, Breschet, and Baron, are sometimes less than natural; and then, if the cranium be of unusual size, the latter may be owing to an hypertrophy of the brain. If paracentesis is ever justifiable in cases of hydrocephalus, in hypertrophy of the brain, it can only be productive of mischievous results.\* Fig. 2 represents the head of a child some

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\* Dean Swift, to use his own words,

“Gave the little wealth he had

To build a house for fools and mad,” &c.

And in this same “house” in Dublin, about a century since, several insane



5 years of age, in which case we were consulted as to the propriety of an operation. From the history of the case, we learned that the head had commenced to grow rapidly shortly after birth, and that the child had never been able to sit or stand erect. Every portion of the cranium was of stony hardness, and with no amount of pressure with the fingers could we produce the slightest indentation. The patient was frequently affected with convulsions and other symptoms of cerebral disturbance, though nutrition was perfect, and the child fat and hearty. He constantly remained in the horizontal position with his head thrown back. Believing the case to be one of hypertrophy, not only of the brain, but of the bones of the cranium, we declined any interference.

In the *Brit. For. Med. Chir. Review*, April, 1846, we find the following attempt by M. Mauthnier to establish the differential diagnosis of hypertrophy of the brain and chronic hydrocephalus:—

#### HYPERTROPHY OF THE BRAIN.

1. The posterior part of the skull first presents an unnatural prominence.

2. Children lie horizontally, or throw the head back.

3. Face puffy, eyes inexpressive or staring, mouth half open.

4. Functional disturbance comes on gradually, not before the period of dentition or weaning, and consists at first in affection of the respiratory apparatus.

5. Patient fat and leucophlegmatic.

#### CHRONIC HYDROCEPHALUS.

1. The forehead is the first part to present an unnatural prominence; the altered direction of the eyes, and the great width of the sutures, are also characteristic.

2. Children lie on the belly, with the head lower than the body, and buried in the pillow.

3. Countenance etiolated, with an expression of premature old age.

4. Functional disturbance begins early, and involves the cerebrum from the beginning.

5. Patient ill nourished, subject to rickets and tabes.

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patients were trephined, on the supposition that their insanity was produced by the brain having become too large for the cranium!

In both affections the skull is commonly enlarged, but to the touch the sensation produced by pressure is widely different; in the one giving the idea of a solid, unyielding case, in the other of a wide separation of the bones, which in many cases are but imperfectly ossified. True, even in hypertrophy, where the progress of the disease has been very rapid, the sutures of the skull, in hypertrophy, may become loose and separate, particularly at the upper part of the head, but these cases are rare. Mr. Paget, in his *Lectures on Surgical Pathology*, Am. Ed., p. 64, remarks that it is very rarely that the due thickness of the skull is attained while its bones are engaged in the extension of their superficial area. "Hence, the weight of an hydrocephalic skull is not much, if at all, greater than that of the healthy one; a large parietal bone (No. 2 in the College Museum), measuring nine inches diagonally, weighs only four ounces, while the weight of an ordinary parietal bone is about three ounces." The extent of the skull, he asserts, is in a measure made up in some of these cases by the symmetrical placing of the wormian bones, thus showing "how the formative process, though thus thrown into straits and difficulties, yet conforms, both in growth and development, with the law of symmetry." This condition of the wormian bones existed in our own patient." Dr. Todd (*Cyclop. Anat. and Physiology*) observes that it is uncertain what the precise change is which the brain undergoes in hypertrophy, but it is probable that in this perverted nutrition, a new material is deposited between or in the proper anatomical elements of the brain, and that there is evidence of a similar condition of the cranial walls, the bones of the skull being preternaturally thick. The substance of the brain is universally firm, and cuts somewhat like cartilage.

To add to the difficulty connected with the differential diagnosis of chronic hydrocephalus and hypertrophy of the brain, these affections are found sometimes to coexist. Otto, indeed, asserted that hydrocephalus is occasionally cured by the supervention of hypertrophy of the brain, but



upon this point Rokitsansky observes (*op. cit.*, p. 359),—"I believe, further, that the hydrocephalus (the hydrocephalic process) may itself sometimes give the first impulse to hypertrophy of the brain; but that any compensation for or cure of hydrocephalus is effected by hypertrophy, appears to be altogether problematical. Such an opinion is founded upon the fact, that in some large skulls of hydrocephalic shape, the brain exceeds the normal size and weight. But I believe that these are cases in which the hypertrophy, having taken place in childhood, has continued ever since; and that belief is confirmed by the resemblance, in shape, which subsists between the skull in hypertrophy and the hydrocephalic skull, as well as by the difficulty which the similarity in the symptoms of hypertrophy and hydrocephalus imposes, upon our determining positively what disease of the brain did exist in childhood. So far as I am aware, the morbid increase in the volume of the brain in hydrocephalus, as well as its normal growth, takes place always in the neighborhood of the enlarged ventricles; it is a peripheral deposition around them; and the skull goes on increasing in size to whatever extent its closure may be prevented by the hydrocephalus."

The skull of Sir Walter Scott was found much thinner than natural after death, and this was supposed to have been caused by cerebral hypertrophy, although the immediate cause of his death was ramollissement of the corpus striatum, producing hemiplegia.

Dr. Forry, the original editor of the *New-York Journal of Medicine*, died Nov. 24th, 1844, from hypertrophy and induration of the brain. For some months before his death he suffered from epilepsy and other severe cerebral disturbance. The anterior and posterior portions of the skull, corresponding to the hypertrophied cerebral substance, were evidently thinned. Long-continued vascular excitement may lead both to hypertrophy and effusion. Dean Swift, who lived like a madman, and expired "a driveller and a fool," is said to have been temperate in early life, yet, by his

intemperance in after years, he produced the hypertrophy of the brain and the effusion within the cranial cavity which, even at the age of 78, caused his death. Up to 1742, when he was 75 years of age, he showed no symptoms whatever of mental disease, beyond the ordinary decay of nature, nor did he have anything like epileptic attacks or general convulsions until some 36 hours before his death, yet we are informed (*Works of Swift*, Dub., Faulkner, 1763, vol. ii., p. 261) that Mr. Whiteway, who examined the body, "found much water in the brain." The frontal region of the cranium was thickened, flattened, unusually smooth and hard in some places, whilst in others it was thinned and roughened. At some points in the occipital fossae, the supraorbital plates, &c., the skull was so thin as to be transparent. (*Vide Mr. Wilde's Report, &c., Dub. Journ. Med. Science*, May and August, 1847.)

Hydrocephalus, therefore, is not a disease confined to any particular age, as is proved by the case reported by Prof. Vrolik, and that of the Dean, just mentioned. Besides these cases, Dr. West refers to another, in which the patient lived to 29 years of age; Dr. Baillie to one of 56 years, whilst Gölis mentions three in which it came on in old age, two of these patients having been upwards of 70 years old. Of course the changes produced upon the skull by chronic hydrocephalus, and hypertrophy of the brain, must vary according to the period of life at which these affections commence. In early life, as in Fig. 2, the cranial bones partake of the hypertrophied action of the brain, and becomes thickened as it expands. In adult life, the effect is different, the bones becoming thinner from the pressure, as seen in the skulls of Sir Walter Scott, Dean Swift, and Dr. Forry. But we have neither time nor space to dwell longer upon this part of the subject, nor could we do so with profit to the reader; for, from among all the writers to which we have been able to refer, we have not succeeded in collecting the elements by which an absolute differential diagnosis in all these cases can be established.



It is not our purpose to discuss the various methods of treatment which have been adopted in chronic hydrocephalus, but shall confine our remarks to puncture of the cranium. The Rev. Mr. Stevens has the credit of being the first to propose trepanning the cranium for hydrocephalus, and this was in the case of Dean Swift, who died in 1745. From Mr. Wilde's report of the Dean's case, to which we have already alluded, we learn that up to 1742; three years before the Dean's death, there were no symptoms of mental disease; and it was not until some 36 hours before his death, that he suffered from epileptic attacks and general convulsions. Consequently we may assume that it was in 1745 that the Rev. Mr. Stephens *proposed* this operation. Dionis, in his *Cours d'Opérations de Chirurgie*, 3d ed., 1736, has the following observations:

"Toutes les espèces d'hydrocéphale demandent la main du chirurgien pour donner issue aux eaux qui font la maladie. Les anciens appliquoient deux cautères potentiels, l'un sur le commencement de la suture sagittale, et l'autre sur la pointe de la suture lambdoïde; les escarres étant tombées, ils laissent sortir la lymphe par ces deux ouvertures, etc. Je suis plutôt pour les scarifications aux parties déclivés de la tête, par où les eaux, dont elle est abreuvée, peuvent suivre," etc.

He then refers to a case of congenital hydrocephalus, which he cured by this method of treatment. In the *Philosophical Transactions*, vol. xlvii., there is the report of a case in which Le Cat punctured the head for hydrocephalus. The operation was performed on the 23d October, 1744. A trocar with a canula much shorter than ordinary was used. On the upper part of the canula were two circles, each fastened to a different piece, so made as to screw on each other. The circles were somewhat concave on their surfaces, so as reciprocally to correspond, their circumferences touching while there remained a tolerable vacuity towards their centre. A circular piece of plaster, with a hole in its centre, was then applied to the lower circle, the screw of which

passed through the hole of the plaster. The object of this arrangement was to prevent the trocar from penetrating too deeply. The trocar and canula were thrust up to the circles and plaster, which was made adherent to the scalp, after which the trocar was withdrawn, when 4 or 5 ounces of serosity, of a brownish white, "or the color of pale white wine," and somewhat foul, was allowed to issue. This was on the 23d October. On the 24th, he unstopped the canula, and drew off the same quantity. On the 25th, "the infant was ill," for which reason he was not disturbed on that day. On the 26th, he was better, and 5 ounces more were withdrawn. Tuesday he was suffered to rest. Whenever the fluid was withdrawn, the head was bound with a strong bandage. The child died on the night of the 27th. The brain was thin, expanded, in contact with the dura mater, forming a kind of thin sack filled with water. Both lateral ventricles were excessively dilated, and but slight traces of the pineal gland, choroid plexus, remained.

Dr. Remmet, of Plymouth, E., operated in 1778, and 80 ounces of fluid were discharged at five different operations. The child died on the seventeenth day.

In *Van Swieten's Commentaries*, vol. xii., p. 248, we find that Petit expressed his regret that all the patients who had been subjected to this operation died. He believed that if a large quantity of water should be drawn off, the patient must die in four or five hours after the discharge; and even if less should be removed, they would still die, though not so speedily, surviving, perhaps, the operation some forty hours, but never longer than this period.

The operation was condemned by Heister, Boerhaave, De la Motte, Paré, Portal, Richter, Gölis, Breschet, Boyer, Dupuytren, Physick. Among the modern opponents of this proceeding we have found none more decided than Dr. Battersby. In his very elaborate paper published in the *Edinburgh Medical and Surgical Journal*, July, 1850, he has most thoroughly entered into the examination of the pathology of this disease, and he declares that all the evidence



thus far derived from morbid anatomy, as well as from the statistics collected upon the subject, goes to prove that puncture in chronic hydrocephalus is a useless and unjustifiable operation. In abdominal dropsies, as well as in hydrocele of the tunica vaginalis testis, he asserts, the simple withdrawal of the fluid is seldom sufficient to effect a cure; and if, in cases like these, he adds, where the containing parts naturally return to their proper position after the fluid is evacuated, it would be absurd to expect that dropsy of the brain, where the parts cannot reassume their normal position, should be cured by paracentesis of the head. The operation he regards as attended with danger, the cases reported showing that puncture is sometimes followed by an almost immediate aggravation of the cerebral symptoms, and by death. Another objection urged by him is that the fluid soon collects again, and even if relief be afforded by the first operation, it is less marked in the second, the quantity of fluid even increasing with its repetition. With this increase in the dimensions of the head, the body becomes emaciated; and death takes place from exhaustion, coma, or convulsions. The number of cases in which the operation has been performed is sufficient to settle the question of its value as a *curative* agent; and, while the statistics bear unfavorably upon it in this light, there can be no question that, as a palliative measure, the surgeon may not unfrequently be justified in resorting to it. Dr. Charles West published in the *London Medical Gazette*, April, 1842, "*An Inquiry into the Results of Puncture of the Head, in cases of Chronic Hydrocephalus*," and so completely has he exhausted the subject up to that time, that we are compelled to avail ourselves of his labors. His Table comprises 56 cases, and we have added such as we have been able to find reported since the date of his publication, a period of twelve years.

No.	Sex.	Age.	Duration of disease.	Symptoms before Puncture.	Size of the Head.	Number and date of Punctures.	Quantity of Fluid in lbs. and ounces.
1	—	b'tween 11 & 12 years	—	Came on in consequence of a fall; head enlarged to a third beyond natural size, and parietal bones opened so as to allow fluctuation to be felt. These symptoms came on three months after the fall.	A third larger than natural	One	1bvj. of water drained away in 20 days.
2	F.	4 m. 11 days	began in 6th week.	Began with fits and enlargement of head. Bowels torpid; strabismus; child had an idiotic look.	Apparently double.	Eighteen Dec. 10. 17. 25. 28. 31. Jan. 5. 9. 14. 19. 23. 28. Feb. 4. 8. 18. 25. Mar. 3. 6. 10.	oz. 1-8 + 5 + 4 + 5 1-2 + 4 + 4 + 7 + 7 1-2 + 7 + 2 6-8 + 10 + 3 1-2 + 0 + 0 + 3 + 3 + 4 + 4 = 76 1-4.
3	F.	12 wks.	began a few days after birth	General health good, but bowels irregular; strabismus, rolling of the eyes.	23 inches in circumference.	Four August 25. Sept. 4 15. Oct. 5.	oz. 3 + 5 1-2 + 1 + 9 1-2 = 19.
4	M.	4 mths.	head large at birth	Child healthy, cheerful, not emaciated. The fluid was supposed to be external to the ventricles.	18 1-2 inches in circumference.	Eleven Jan. 8. 15. 23. Feb. 19. Mar. 15. 19. Ap. 19. 27. May 5. 17. Ju. 23.	oz. 1 1-2 + 2 + 2 + 2 1-4 + 1 1-2 + 2 1-4 + 1 1-2 + 1 1-2 + 2 1-4 + 2 1-2 + 2 = 21 1-4
5	—	14 m.	—	—	—	Nine within 4 months	Ojss. by first puncture, less by subsequent ones.
6	—	10 m.	excited from birth	Child very ill; pupils dilated. States that inflammation of the brain and its membranes existed, but does not mention a single symptom.	—	One	oz. 24.
7	F	20 m.	began in 14th month	Head had been gradually enlarging for half a year.	—	One	oz. 2, but a large quantity supposed to be Oij. drained away.
8	M.	5 mths.	congenital	Hiccough and vomiting; eyes heavy, somewhat convulsed.	Head of enormous size from birth.	Two beginning of Aug. Sept. 3	oz. 12 + 12 = 24.
9	F.	—	—	—	—	Five	oz. 55.
10	F.	—	—	—	—	Three	oz. 26.
11	F.	—	—	—	—	One	oz. 13.
12	F.	—	—	—	—	One	oz. 9.
13	M.	—	—	—	—	One	oz. 6.
14	F.	—	—	—	—	Three	oz. 31 1-2.
15	M.	—	—	—	—	Two	oz. 14.
16	M.	—	—	—	—	One	oz. 9.



Subsequent Progress.	Date of Report.	Authorities.
"Patient was saved."	—	Monroe on Hydrocephalus, p. 146, quotes the case from Prof. Rossi.
The fluid removed was clear first, but, on the 8th and 9th punctures, was of a darker color and thicker consistence, but regained its transparency at subsequent operations. The immediate effects of the puncture were never serious. Slight febrile symptoms, and occasional vomiting, and fretfulness, occurred at different periods, but fits only once, just before the sixth operation. The ossification of the head proceeded so that the situation of the first puncture became ossified.	Ninety days after first puncture, day of last puncture. Case then going on favorably.	Mr. Lizars, Ed. Medical and Surg. Journal, vol. xvii. p. 243.
The fluid was serous, on the second time was turbid and mixed with flakes of lymph. Slight fever after first, not after others. Ossification advanced; head diminished; child went on well; obscure fluctuation remained three weeks after last puncture. Calomel was then given, so as to affect the mouth.	Four months after last puncture, then stout, healthy, and very large of her age. Head ossified, except anterior fontanelle, and four inches less in circumference.	Mr. Russell, Ed. Medical and Surg. Journal, vol. xxxviii. p. 43.
After each operation there was great faintness, pallor, and failing of the heart's action during several hours. Great restlessness followed for a night or two after each operation.	Seventeen months after last puncture, child was healthy and head measured 18 3-4 inches in circumference.	Graefe, Graefe and Walther's Journal, Bd. xv. S. 348.
Great improvement followed the first puncture, the others left the child in a very satisfactory state.	Died of pneumonia more than a year afterwards.	<div data-bbox="756 932 979 1058">Dr. Fourcade, Lancette Francaise, vol. iv., No. 47, p. 188, reports from recollection, case operated on by Dr. Bédor.</div> <div data-bbox="756 1058 979 1142">Mr. Marsh, Medical Gazette, vol. xvii. p. 985.</div>
Iodide of potassium ointment employed; calomel and mild aperients given. "Though the little sufferer was for some time in a precarious state, he did recover, and is now a very fine boy, never having had the slightest return of the complaint."	—	
One convulsion followed the puncture, and afterwards other symptoms of meningeal irritation.	Two and a half years afterwards, health and intellect good.	
Continued weakly during the day of puncture, but more lively than before, and for some time after the intensity of all the former symptoms diminished. A month after it was found necessary to repeat the puncture.	Nearly eight years after, head then too large, but not larger than before the operation. Health good.	
— — — — — — —	Five years after, head 22 inches round; ossification complete, except posterior fontanelle, and two openings in coronal suture. Health good, remarkably shrewd.	Dr. Conquest, Lancet, March 17, 1838; and Med. Gaz., vol. xxi. p. 967.

No.	Sex.	Age.	Duration of disease.	Symptoms before Puncture.	Size of the Head.	No. of Punctures.	Quantity of Fluid.	Immediate Effect.
1	M.	9 m.	Began at 3d month.	Sucked well, but was emaciated.	At 8th month larger than head of a man.	One.	1lb. Fluid continued to drain away afterwards.	—
2	M.	3 m.	Began in 7th week.	Well nourished, but fretful.	Sutures separated.	Three.	$5 + 5 + 5 = 15$	—
3	—	3 m.	—	—	Very large.	One.	—	Bore operation well.
4	—	2 m.	Congenital.	Healthy and strong; head had much increased in size; eyes very prominent.	—	Five.	$10 + 12 + 14 + 12 + 32 = 80$	—
5	M.	2 y.	Congenital.	Well.	25 inches round at 6th month.	One.	—	—
6	F.	5 m.	Noticed at 5th month.	Indisposed for three weeks with crying and screaming. Pupils immovable.	Very large, fluctuating.	Six.	$9\frac{1}{2} + 9\frac{1}{2} + 6 + 4 + 2\frac{1}{2} + 1\frac{1}{2} = 29\frac{1}{4}$	Sickness and vomiting after 2d; 4th puncture made in the fontanelle; $4\frac{1}{2}$ oz. of blood escaped, and child seemed likely to die.
7	M.	9 m. 20 d	Congenital.	Good, and continued so, notwithstanding fruitless employment of medicines; head hot, appetite craving.	23 inches round above tips of ears.	Ten.	$4\frac{1}{2} + \frac{1}{4} + 5 + 3 + 3\frac{1}{2} + 3 + 3\frac{3}{8} + 3\frac{1}{2} + 4 + 2 = 40.$	No striking effect.
8	M.	9 m.	Congenital.	Child had a spina bifida, but health good.	27 inches round.	Three.	$10 + 16 + 15 = 40$	—
9	F.	4 m.	Congenital.	General health good; head had progressively enlarged.	24 inches round.	Eight.	$12 + 12 + 12 + 9 + 12 + 3 + 9 + 12 = 81.$	Very slight except after 5th puncture, when faintness was produced.
10	—	6 m.	Six or seven weeks after birth.	Always quiet, but tolerable health to 5th week; became gradually emaciated; bowels irregular; constant crying, no sleep.	23 inches round.	1, but wound opened twice a day for several days.	116 in course of 8 days.	—



Subsequent Progress.	Date of Death.	Condition of the Brain after Death.	Authorities.
Child sank.	36 hours after the puncture.	—	Fabricius Hildanus, <i>Observ. Chirurg. cent. iii. obs. 17.</i>
Well for two days, then taken ill: died on evening of 4th day.	84 hours after 1st, 36 after last puncture.	Excessive dilatation of ventricles; atrophy of pineal gland; very little trace of choroid plexuses.	Le Cat, <i>Philosoph. Trans. v. xlvii. p. 257.</i>
—	Day after the puncture.	Fluid between cranium and dura mater.	La Motte, <i>Traité complet de Chirurgie, tome i. obs. 115.</i>
After third puncture, head reduced to natural size; after 1st week, head swelled again. Exhaustion came on 3 weeks after 5th puncture; death in ten days.	3 m'ths 9 days after 1st, 31 days after last puncture.	Cavity of brain full of enormous quantity of clear water; scarcely any brain found, but only medulla oblongata, and a small quantity of brain behind the orbits.	Dr. Remmet, <i>Edin. Med. Comment. vol. vi. part 4</i>
—	16 hours after puncture.	Two pounds of clear fluid contained in brain, in cysts, with vascular coats: cerebellum around fourth ventricle hard; <i>cura cerebri ulcerated.</i>	Dr. A. Monroe, <i>Morbid Anatomy of the Brain, vol. i. p. 11.</i>
More lively; convulsions; and hemiplegia affecting right side, on third day after first puncture, ceasing in course of one day. Diarrhoea for some days. Coma before second and third punctures; relieved by the operation. Seemed better on day of sixth puncture; fits on following day; tranquil death soon after.	37 days after 1st, 1 day after last puncture.	Two pounds of sero-sanguineous fluid in ventricles; walls of ventricles very thin; brain soft; coagulum size of a hazel-nut in posterior corner of left lateral ventricle.	Mr. R. Brown, <i>Med. and Phys. Journal, vol. li. p. 102.</i>
Slight improvement followed each puncture. Continued well, except erysipelas of face, till day of last puncture; then, convulsions returning frequently, child wasting till death.	84 days after 1st, 11 after last puncture.	Dura mater thickened; pia mater inflamed; cerebral substance very thin, lined by false membrane; no trace of corpus striatum, callosum, etc.; bag of cerebrum divided into cells by membranous bands, contained 35 ozs. of fluid; cerebellum firm.	Mr. Money, <i>Med. and Phys. Journ., vol. lii. p. 462.</i>
—	30 days after 1st puncture, 9 after last.	—	Mr. Grey, <i>Med. and Phys. Journ., vol. liv. p. 204.</i>
Health good for a few days; considerable exhaustion after 2d puncture. On 5th puncture, 6 weeks after 1st, situation of original puncture ossified. Two convulsions before 7th puncture, again after 8th. Seemed going on well, though fluid re-collected; head greatly diminished in size. sutures, which had been 3 inches across, came into apposition. On the 9th day, convulsions, coma, death.	110 days after 1st, 8 after last puncture.	Fluid between dura and pia mater; the former thickened, but with no signs of acute inflammation; brain nearly all absorbed, not larger than a hen's egg, soft, and parts not distinguishable.	Dr. Glover, <i>Philadelphia Journ. of Med. and Phys. Sciences, vol. ii. p. 159.</i>
	9th day from the puncture.	Membranes gangrenous for several inches round puncture, contained 4 pounds of turbid, fetid fluid; whole upper part of brain disappeared; some at base, like pons varolii.	Dr. Whitmore, <i>American Me. Recorder, July, 1821.</i>

No.	Sex.	Age	Duration of Disease.	Symptoms before Puncture.	Size of the Head.	No. of Punctures.	Quantity of Fluid.	Immediate Effect.
11	M.	7 m.	Began about a month after birth.	Fever; screaming; squinting at 3d week; in ten days enlargement of head, which increased; other symptoms abated.	21½ inches round.	One	6	Vomiting soon after.
12	M.	8 m.	Began in 3d month	Sickly from birth; convulsions at two months; emaciation; constant crying; strabismus.	21½ inches round	Five	$14\frac{1}{2} + 3\frac{1}{2} + 7 + 7 + 16 = 47\frac{1}{2}$	Uneasy during 1st, sensible of pain afterwards; uneasy and occasionally convulsed after 5th.
13	M.	11 w	Began in 6th week	Always fretful, throve till 6th week, then wasted; head swelled. No squinting.	Fluctuation in head distinct.	Six	6 by first, afterwards $+ 36 = 42$	No inconvenience; sensible improvement.
14	M.	5 m.	Began at 2 months	Good for two months, but head always inclined to side; then swelling of head, fits of crying, cough, and emaciation. No vomiting or convulsions.	20½ inches in circumference.	One	11	None; head much collapsed; vomited same evening.
15	—	5 w.	—	—	Supposed to contain 2 to 3 pints.	Five	$4 + 3 + 4 + 4 + 4 = 19$	—
16	—	6½ m	Began in 4th m'th	Well nourished: general symptoms very slight.	—	One	37	Brain protruded through 1st puncture (with a lancet), which was therefore repeated.
17	F.	16 m	Began at end of 3d month	Began with convulsions; health then good until dentition began, then lost motion of left arm and leg; had fits with each tooth, and occasional strabismus.	26 inches round.	One	2½, and more drained from wound.	Considerable collapse.
18	F.	16 m	Began at 4th m'th.	Health bad; pupils dilated; insensible to light; coma for several months; occasional convulsions.	—	One	20	Cold, faint, lips livid, requiring strong stimulants.
19	F.	6 m. 3 w.	Began at 5th m'th.	Great strabismus.	18 inches in circumference.	Four	$9 + 2 + 3 + 2\frac{1}{2} = 16\frac{1}{2}$	No suffering.



Subsequent Progress.	Date of Death.	Condition of the Brain after Death.	Authorities.
First night restless; next night better; screaming 58 hours after, followed by fits; and death, in fit, 14 hours after.	72 hours after puncture.	No trace of inflammation; brain very soft; two transparent sacs in left ventricle, one in right communicating with third and fourth; they were smooth and tough, attached to brain at under, unconnected at upper surface; nates and testes formed a tumor, containing one drachm of pus; lower parts of brain healthy.	Mr. Hood, Ed. Med. Surg. Jour., vol. xvii. p. 510, Oct. 1821.
Slight convulsions on night after 1st puncture; improvement, less strabismus, increased ossification; cried much after 4th convulsions, and death 3 days after 5th.	51 days after 1st puncture, 3 after last.	No sign of inflammation; fluid in ventricles; brain greatly expanded; cerebellum healthy.	Dr. Freckelton, Ed. Med. Surg. Jour., vol. xvii. p. 240.
Relief after each puncture; a fortnight after last, water ceased to accumulate. No ossification of skull.	11 weeks after 1st puncture, 3 after last.	No sign of recent inflammation; 2½ lbs. of fluid in sac of arachnoid; atrophy of cerebrum which was not larger than a bean.	Mr. J. Sym, Ed. Med. Surg. Jour., vol. xxiv. p. 295.
Went on well till 3d day, head being 2½ inches smaller. On 3d day great restlessness, vomiting, rigidity of one arm, convulsions; death on 4th day.	87 hours after the puncture.	No inflammation of brain or its membranes; ventricles contained yellowish white fluid, like seropurulent fluid and water, with albuminous flakes; some softening of ventricles.	Dr. J. Alison, Ed. Med. Surg. Jour., vol. xliii. p. 359.
—	16 weeks after 1st, 5 weeks after last operation.	—	Mr. Callaway, as reported by Oppenheim, Rust's Mag., v. xxiv. p. 77.
Pretty well, but somewhat excited 1st day; head filled again between 3d and 6th day; on 7th, a gush of fluid from situation of 1st puncture, followed by convulsions and involuntary discharge of urine and feces.	9th day after the puncture.	—	Dr. Roechling, Hufeland's Jour., Aug. 1826, p. 114.
A little improved 1st night, pretty well till third day; then violent convulsions and death.	4th day after the puncture.	Brain bloodless; 2 pounds of fluid in ventricles; great thinning of their walls, of right especially, which formed a mere membranous bag, and was in parts of consistence of cream; parts at floor of left ventricle barely recognizable; at floor of right undistinguishable; cerebellum and base of brain healthy.	Dr. S. Hall, Med. Gaz., vol. vi. p. 334.
Slight fever for a few days, then seemed better. In 10 days water began to accumulate. In 1 month and 3 days symptoms of nervous debility, in 3 days more painless death.	5 weeks after the puncture.	No trace of inflammation; great accumulation of fluid in the ventricles.	Mr. Marsden, Lancet, Feb. 12, 1831. p. 648.
Vomiting on 2d and 3d day, fever on 4th, coma on 5th, convulsions on 6th.	6 days after puncture.	One pound of fluid in cranium; puncture had not penetrated the brain; dura mater adherent to skull; brain soft and very vascular; great distention of lateral ventricles with fluid; no inflammation about puncture.	Oppenheim, Rust's Mag. v. xxiv p. 89.

## TABULAR VIEW OF CASES OF INTERNAL HYDROCEPHALUS IN

No.	Sex.	Age	Duration of Disease.	Symptoms before Puncture.	Size of the Head.	No. of Punctures.	Quantity of Fluid.	Immedi'te Effect.
20	—	15w.	—	—	—	One	10	—
21	—	9 m.	—	Great emaciation.	30 in hes in circum- ference.	One	10	—
22	—	2 m.	Con- genital.	Health tolerably good —child intelligent.	23 inches in circum- ference.	Two	28	Improved ap- pearance.
23	M.	4 m.	Began at 1 month.	Good, except frequent convulsions.	21 inches in circum- ference.	Seven	$1\frac{1}{2} + 2 + 6 + 11 + 15 + 12\frac{1}{2} + 14 = 63.$	None.
24	—	3 m.	Began at 1 month.	Health good, but bow- els costive; had spasms when a week old, ceas- ed after 3 weeks, when head suddenly enlarg- ed.	—	Four	$14 + 17 + 14 + 13\frac{1}{2} = 58\frac{1}{2}.$	Slight hamor- rhage from a ves- sel at 3d punc- ture.
25	M.	7 m. 12 d.	Began at 2d month	Small-pox at 5th week; enlargment of head from 2d month; at 5th month blind; oscilla- tion of eyes; starting and screaming, after- wards fits.	22 $\frac{1}{2}$ inches round at 5th month.	Ten	$4 + 5 + 6 + 7 + 12 + 16 + 12 + 28 + 42 + 20 = 153$	After three of the punctures, faint and pale, and once vomited. Nothing after any of the others.
26	F.	10 d.	Con- genital.	Good at birth; at end of ten days head hot; child fretful; bowels disordered.	Head at birth twice natu- ral size.	Two	$10 + 8 = 18$	After 1st punc- ture cold, faint, as though about to die; state after 2d not mention- ed.
27	M.	8 m.	Began at end of 4th m'th.	Health quite good up to 10th week, even now tolerably good; bowels regular; well nourish- ed; eyes constantly rolling.	22 $\frac{1}{2}$ inches in circum- ference.	Four	$20 + 23 + 22 + 19 = 84$	No peculiar ef- fect.



Subsequent Progress.	Date of Death.	Condition of the Brain after Death.	Authorities.
—	—	All the ventricles formed but one large cavity, covered by but very little brain.	Ruppius, in Meissner's <i>Forschungen</i> , vol. iii. p. 240.
—	In a few days after the puncture.	—	Meissner, <i>Die Kinderkrankheiten</i> , vol. ii. p. 187.
Exhalat'n offense of hearing; then improvement for 2 or 3 days; re-accumulation of fluid in a fortnight, gradual sinking after 2d puncture.	3 weeks after 1st puncture, 1 week after last.	Great vascularity of the membranes; softening of the brain; accumulation of fluid in the ventricles.	Mr. F. Cooper, <i>Lancet</i> , June 27, 1835, p. 405.
Convulsions ceased a few hours after 1st puncture; returned slightly before 3d and 5th. Health good till day before last puncture, then stupor; relieved for a time by puncture; 2 days after, quiet death.	115 days after 1st, 2 after last puncture.	Membranes pale, bloodless; septum lucidum torn; lateral ventricles formed one large sac, lined by thick flakes of matter, like pus or mucus.	Prof. L. A. Dugas, <i>Amer. Journ. of Med. Sciences</i> , vol. xx. p. 536.
Convulsions on 5th day; continued enlargement of head after each puncture; occasional convulsions, followed at length by coma and death.	62 days after 1st, 11 after last operation.	Fluid in ventricles; great thinning of the brain; hole through falx and tentorium; cerebellum healthy.	Dr. J. B. Withridge, <i>Am. Jour. of Med. Sciences</i> , vol. xx. p. 538.
Improvement for 2 months, and progressing ossification; then improvement ceased, and head became quite as large as ever.	131 days after 1st puncture, 2 days after last.	Arachnoid engorged; fluid in all three ventricles; brain very soft; lymph at its base.	Dr. J. R. Smyth, <i>Med. Gaz.</i> vol. xxv. p. 83.
Convulsions came on, but ceased some weeks, till day before death, and child died in a fit.			
After 1st puncture, seemed improved; water re-accumulated at end of a week; after 2d, no improvement; at end of a fortnight after, head as large as before. Parents would not permit its repetition. Child wasted; died convulsed.	6 months 5 days after 1st, 5 months 12 days after last operation.	Fluid under dura mater; cerebrum so flattened that parts were undistinguishable.	Mr. Armstrong, <i>Med. Gaz.</i> v. xxvi. p. 226.
Occasional vomiting; slight convulsions; head rapidly regained its size. 14 days after last puncture, moaning, crying, contractions of limbs, faintness, and difficult breathing came on.	7 weeks 3 days after 1st, 15 days after last operation.	Fluid within the membranes; left hemisphere almost totally destroyed, right greatly compressed; optic nerves diseased; left olfactory destroyed; right nearly so; cerebellum healthy.	Dr. Kilgour, <i>Ed. Med. Surg. Jour.</i> , vol. liii. p. 365.

No.	Sex.	Age	Duration of Disease.	Symptoms before Puncture.	Size of the head.	No. of Punctures.	Quantity of Fluid.	Immediate Effect.
28	F.	9 m	Began in 3d month	Healthy; in 15th week able to hold up its head, though very large; cried occasionally; continued well to 9th month, but head then too big to move.	21½ inches in circumference.	One	4, much drained away.	½ oz. of blood escaped; 4 d'ys after, on passing a probe, 4 oz. of water.
29	—	8 m	Began at 4th m'th	Screamed very often; slight convulsions; occasional vomiting; distortion of eyes downwards.	—	Two	4 + 3 = 7	Improved appearance followed immediately.
30	—	7 m	Began at 2d month	Good health.	19 1-6 inches in circumference.	Two	20 + 28½ = 48½	Pale, cried slightly after 1st; pale, did not cry after second.
31	F.	12 w 1 d	Began in 3d week.	Fits of crying a fortnight after birth continued to recur, but without convulsions or strabismus.	16½ inches in circumference.	Five	12 + 12 + 5 + 8 + 6 = 53	Crying ceased; child seemed more comfortable.
32	M.	—	—	—	—	Five	48½	—
33	M.	—	—	—	—	Four	45	—
34	M.	—	—	—	—	Two	20	—
35	M.	—	—	—	—	One	8	—
36	M.	—	—	—	—	Two	22	—
37	M.	—	—	—	—	Two	17	—
38	F.	—	—	—	—	One	7½	—
39	F.	—	—	—	—	Four	33	—
40	M.	15 m	Began at 5th m'th.	Inward fits from birth; emaciation at a fortnight; increase of head and fits at 5 mo.; general health improved until 14 months, then fits more frequent, and child wasted more; but appetite very good.	26 inches in circumference.	One	16	—
41	—	6 m	—	Comatose, moaning, pupils dilated, insensible; no strabismus.	20 inches round.	Five	10 + 10 + 10 + 10 + 10 = 50	Aroused in a marked manner after each operation.
42	M.	17 m	15 m.	Blind; pupils natural size, and sensitive to light; constant rolling of eyes; fluctuation of head; veins distended.	27½ inches round, 18½ over vertex from ear to ear.	One	20	No change.



Subsequent Progress.	Date of Death.	Condition of the Brain after Death.	Authorities.
On day after the escape of the fluid, slight convulsions, eyes less distorted, but child began to sink, whined, then threw its arms about.	6th day after puncture.	Some congestion of membranes; near puncture; brain quite white, very soft; ventricles immensely distended; cerebral substance seemed macerated, infiltrated with water; parts in ventricles undistinguishable; nerves at base soft; cerebellum large, soft; cavity in its centre; no trace of arbor vitæ.	Dr. Schaeffer, Casper's Wochen-schrift, Aug. 19, 1837.
On evening of 4th day after first tapping, child grew dull; respiration hurried, and death took place before midnight.	4th day after 1st, 3d after 2d puncture.		Dr. Watson in Tweedie's Lib. of Med. p. 147.
After 2d puncture, cerebral symptoms came on, head being smaller. Head regained size in 10 days after 1st puncture.	24 days after 1st, 24 after 2d puncture.		Malgaigne, l'Expérience, Nov. 19, 1840.
Occasional fits for ten days after 2d puncture; then frequent screaming, and increasing weakness, without fits, till 2 days before death, when they returned frequently.	15 weeks after 1st puncture, 5 w'ks after last.	Twenty-nine ounces of clear fluid in ventricles, which were lined by a brownish mucus; septum lucidum thickened; small tubercle at decussation of optic nerves.	Dr. Coldstream, Edin. Monthly Journ. of Med. Sci. April, 1841.
—	—	—	Dr. Conquest, Lancet, March 17, 1838; and Med. Gaz. vol. xxi. p. 967.
—	—	—	
—	—	—	
—	—	—	
—	—	—	
Daily fits for 4 days, with more sluggish condition than before. In 7 days, head as large as before the puncture, to the repetition of which parents would not consent; refused food; diarrhoea for 7 days; emaciation, increased weakness; death,	17 days after the puncture.	Seventy-five ounces of fluid in the ventricles, and infiltrated into brain, which was split up into layers forming several distinct pouches; the walls of these pouches were not formed by false membrane, but were all continuous with the corpus callosum, into which their fibres might be traced; cerebral substance at base had a jelly-like appearance; optic nerves much spread out; fluid infiltrated between fibres of cerebellum.	The writer.
Strapped head with adhesive plaster, fluid rapidly regenerated, no change of symptom.	5 weeks after 1st, soon after last operation.	Convolutions flattened; cerebral substance half an inch thick; pint of clear fluid in ventricles; no signs of inflammation from operation.	Dr. Parkman, Am. Journ. Med. Sci., Oct. 1848.
Fluid continued to flow from wound; on 4th day was more restless; spasmodic closure of hands; head more tense.	6th day after operation.	Hemispheres mere sacs, the parietes being an inch thick; convolutions obliterated; 4 pints turbid serum in ventricles; cortical and medullary matter lost where most distension; cerebellum, pons varolii and medulla oblongata natural.	Dr. Pepper, Quar. Sum. Trans. of Col. Phys. and Surg., Phila., vol. iii.

No.	Sex.	Age	Duration of Disease.	Symptoms before Puncture.	Size of Head.	No. of Punctures.	Quantity of Fluid.	Immed'e Effect.
43	—	8 y.	—	—	—	One	32	—
44	—	3 m	3 m.	Head hotter than natural; nursed well; wakefulness at night; aversion to light; axes of vision formed an angle of $90^{\circ}$ from pressure of fluid.	27 inches round, 15 over vertex.	Two	$8 + 14 = 22$	—
45	—	5 m	Con-genital.	—	—	Two	$4 + 6\frac{1}{2} = 10\frac{1}{2}$	—
46	F.	4 m	Con-genital.	Head diaphanous; eyes rolling; pupils dilated; slight strabismus; no convulsions.	$29\frac{1}{2}$ inches round, $19\frac{1}{2}$ ov'r vertex.	One	8	Fulse free; appeared better.
47	—	—	Con-genital.	Obstruct'd labor; punctured head.	—	One	32	—
48	—	12 y	—	—	—	Nine	4 to 40 each time = 143	—
49	F.	9 w	7 w.	Drowsiness; in other respects well.	$19\frac{1}{2}$ inches in circumference. 8 between March and Aug.	—	89 ozs.	—
50	M.	9 m	8 m.	Vomiting and drowsiness.	24 inches in circumference.	One	9 ozs.	—



Subsequent Progress.	Date of Death.	Condition of the Brain after Death.	Authorities.
Began to sink in a few hours.	36 hours after operation.	No injury to any part.	Mr. Taylor, Lon. Med. Gaz. 1850,
Applied compress and adhesive plaster; fluid continued to flow; bandage; urine more free; 12 days after operation child better, and continued to improve for about 6 weeks when fluid again began to collect; in two months 2nd operation, after which it failed gradually.	53 days after first puncture; 20 after last.	Strong marks of inflammation of meninges; brain a mere pulpy sac; with scarcely a trace remaining of parts usually found in cerebral dissections; cerebellum unaltered.	Dr. C. A. Lee, N. Y. Med. and Phys. Jour., vol. vi.
Went on favorably for several days; died comatose.	—	—	Mr. Chater, Prov. Med. and Surg. Journ., 1845.
Applied bandages; 2d day better; 3d day fever, head hot, convulsive movements; 4th day much better, no strabismus, movement of limbs and head free, no fever, appetite good, size of head diminished; 8th day improving markedly; took cold, died on 9th day of a bronchitis.	9 days after operation.	Fontanelles sunk; head 22½ inches round, 15½ over vertex; no signs of inflammation; cerebrum spread out like a sac, being ¼ of an inch thick, but of natural consistence; no convolutions; corpus callosum or septum lucidum found; base of brain normal.	Mr. Totlow, Lancet, p. 100, 1839.
Wound healed readily; child thrived for 23 days; had convulsions from re-accumulation of water.	23 days after operation.	No signs of inflammation; one quart of water in cranium.	Dr. Rose, Am. Med. Record, vol. 13.
Symptoms improved after 1st 6 operations; water rapidly re-collected each time in large quantities.	4 months after first operation	No marks of inflammation about wound.	Dr. Smyth, Miscel. Contribu. to Path. and Therap., 1844.
—	9 m'ths 1 w'k after 1st operation.	Lat. ventricles formed one cavity; absence of fornix, septum lucidum, corpus callosum and choroid plexus; corpora striata and optic thalami flattened; cerebellum soft; nerves all perfect.	Battersby.
—	6 days after operation.	Convulsions on upper surface obliterated; brain formed a large bag; central white parts absent, as well as corpus callosum, fornix, septum lucidum, fifth ventricle, and choroid plexus; optic thalami and corpora striata flattened, and of unnatural appearance; medulla oblongata, cerebellum, pons varolii, and crura cerebri, healthy and hard.	Battersby, Ed. Med. and Surg. Journ., vol. ii. 1850.

No.	Sex.	Age	Duration of Disease.	Symptoms before Puncture.	Size of the Head. :	No. and Date of Punctures.	Quantity of Fluid in lbs and. ounces.
51	M.	8 m	6 m.	Fretful and nervous ; diarrhœa and costiveness alternately ; finally squinting and convulsions.	—	One	℥ viij of a reddish fluid.
52	M.	14 m	6 m.	Tendency to coma ; tremulous eyelids ; slow pulse ; stertorous breathing ; strabismus :	—	1, April 6.	℥ xvi limpid.
53	—	—	—	Blindness ; partial paralysis ; face contorted ; extremities placid.	23 inches round, 14 vertical.	Three	12 + 8 +

In relation to the first 16 cases in this table which are reported as successful, (and the same remarks are applicable to the three cases which we have added,) Dr. West very properly observes that chronic hydrocephalus is a disease usually slow in its progress, and intermittent in its advances, occasionally pausing for months, or even years, and then increasing without any evident cause ; consequently, before any case be admitted as cured, it must be shown that a considerable time has elapsed since the operation, and that during this period the health of the patient has been perfectly good. The cases which he has collected he regards as affording but little encouragement to resort to it, as might be expected from the appearance frequently presented after death, as in many cases there exists serious organic disease or malformation of the brain itself, “though no symptom during life had betrayed the existence of a condition which mechanical interference could only aggravate.”

Dr. Watson, on the other hand, employs very different language in reference to this operation. In his *Lectures*, p. 284, Am. Ed., he remarks : “He must have been a bold physician who first proposed to decant the water from the brain, by means of a perforation, made with a trocar, through the membrane of the fontanelle, through the membranes of the brain, and through even the expanded cerebral substance itself. But the success of the project has amply vindicated



Subsequent Progress.	Date of Report.	Authorities.
Blood oozed from nostrils for 24 hours; bandage; gave aperients and nourishing diet; former symptoms gradually disappeared.	Seven years.	Dr. Edward, Monthly Journ. Med. and Scien., 1846.
Left wound open, and about 4 pints fluid gradually drained off, with gradual contraction of head and closure of open spaces.	Four months.	Mr. Kitsell, Prov. Med and Surg. Journ., 1849.
Paralysis disappeared; countenance natural; head diminished; sight returned; strabismus ceased; regained her natural playfulness.	Several months after operation died of typhoid fever.	Dr. Howard, Trans. Med. Journ., 1852.

this happy audacity. Though denounced as useless and cruel by some high continental authorities, by Gölis and Richter especially, it furnishes one of the best of the few chances of safety to the patient. Of course, I mean ultimate safety, for the operation itself is attended with the present risk of accelerating the patient's death. We have to consider that, by performing the operation, we incur the danger of abbreviating the existence of a being whose life without it could scarcely be long continued, or capable of enjoyment, but then we afford some chance of a perfect cure. A speedy death, or an uncertain life of mental and bodily imbecility, or complete restoration—these are the three events to be looked at. Had I to decide the painful question in reference to one of my own children, I would accept the alternative of probable speedy death on the one hand, or possible complete recovery on the other."

Malgaigne, after examining a great number of facts bearing upon this question, comes to the conclusion: 1st, that the operation may be tried when the patient is from three to four months old, and the disease appears to be stationary; 2d, after this period, when the disease is evidently increasing and threatens the life of the patient. (*Bull de Thérapeutique*, 1840.)

Dr. Copland observes, "While, therefore, I so far agree

with those who argue for the operation, as to advise it to be tried after the measures I have detailed above have failed, yet I would not recommend its performance early in the disease: 1st, because medical treatment has then sometimes effected a cure, especially when the head has not been very greatly enlarged; and 2dly, because, when the fluid is in the ventricles, as it generally is in cases commencing after birth, a greater depth of brain must be penetrated to reach it at an early than at a later period." (*Dictionary of Practical Medicine*, vol. i., Am. Ed., p. 779.)

Dr. Charles A. Lee has advised a resort to puncture of the ventricles, even when to effect this object it is necessary to pass the instrument to a great depth. A puncture of the ventricles in cases like our own is not a matter of difficulty, as the distended ventricles formed together one vast cavity.

Dr. Joy, in the *Cyclopædia of Practical Medicine*, vol. ii., Lon. Ed., p. 478, thus expresses his opinion on the subject: "There are a few cases on record where it has appeared to effect a cure, and several where it has palliated the symptoms. In cautious hands, and where only a moderate quantity of water is drawn off at a time, it has rarely been attended with any danger. In cases where all other kinds of treatment have been tried without benefit, this is, perhaps, not altogether to be rejected."

Riliet and Barthez, Barrier and Legendre sanction the operation only in cases of hydrocephalus arising from sanguineous effusion into the arachnoid cavity, a form of the disease by all authorities admitted to be rare. In cases of acquired chronic hydrocephalus, resulting from a cerebral tumor, or a profound alteration of the brain, they would not recommend it.

Mr. Fergusson regards the operation as worthy of trial, and relates several instances in which it has been performed by himself and his friends. He states that, although his own experience does not enable him to be very sanguine of great success from this proceeding, yet that which has been ob-



tained by others is, in his opinion, a sufficient sanction for a continuance of the practice in all "favorable-looking cases." (*Practical Surgery*, 3d Lon. Ed., p. 556.)

Dieffenbach is strongly opposed to the operation, having, during the earlier part of his professional career, had three unsuccessful cases. Although success may in some few cases have followed it, yet on the whole he is disposed to consider them as fortunate escapes, like those which have been recorded in which a sailor recovered after a ship's anchor had passed through his abdomen, or the shaft of a cabriolet had pierced the thorax of a coachman, &c., &c., upon which cures a surgeon has no right to calculate. (*Operative Chirurgie*, Zweiter Band, Leipzig. 1848, p. 9.)

Dr. Battersby states that he is acquainted with ten cases in which the operation has been unsuccessfully tried in Dublin, and there can be no doubt that a large number of fatal cases remain, and will ever remain unknown. We have been informed by Prof. Stevens Parker, Dr. Watson, and others in this city, of several cases in which the operation has not averted a fatal termination. Still, we feel persuaded that, in cases similar to our own, and for the end proposed in this case, a surgeon would be justified in resorting to it.

Having thus noticed the sentiments of some of the most prominent authorities as to the propriety of resorting to puncture in chronic hydrocephalus, we would remark, in connection with the cases collected by ourselves and appended to the table of Dr. West, that they do not materially affect the conclusions to which this distinguished physician had arrived. In our own case, the operation was not performed with the expectation of effecting a cure. The very idea of the thing would have been perfectly absurd.

One word as to the proper instrument to be employed in this operation. Dr. Watson states, *op. cit.*, p. 286, that he once requested a surgeon to perform it upon a child, and, to their horror, when the trocar was withdrawn from the canula, "instead of clear serosity, a fine stream of purple blood spouted forth. We naturally thought it was all over with

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